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A BUDWORM, ARGYROTAENIA SP., OUTBREAK ON THE WALLACE AND CABINET RANGER DISTRICTS,

Idaho Panhandle and Kootenai National Forests

by S. Tunnock and J. Hard

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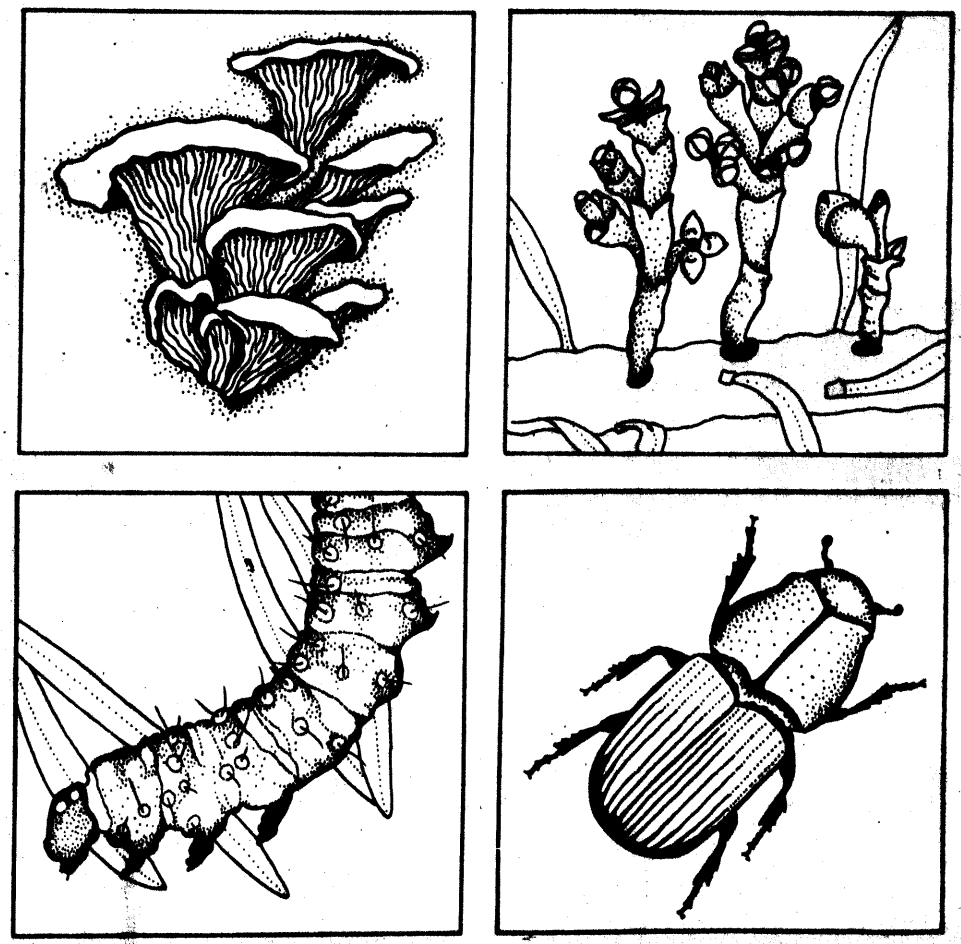

A BUDWORM, ARGYROTAENIA SP., OUTBREAK ON THE WALLACE AND CABINET RANGER DISTRICTS, IDAHO PANHANDLE AND KOOTENAI NATIONAL FORESTS 1979

By

Scott Tunnock and John Hard
Entomologists

ABSTRACT

Defoliation of mountain hemlock and other conifers by a budworm, Argyrotaenia sp., near gogana (Kearfott), increased from about 40 acres in 1978 to several thousand in 1979. The infestation, which is along the Idaho-Montana border of the Wallace and Cabinet Ranger Districts, is expected to continue in 1980. This budworm has a 1-year life cycle. It overwinters in the pupal stage and moths probably lay eggs on needles by June. Larvae have been observed feeding until the end of October.

INTRODUCTION

An unknown budworm was discovered[1/] heavily defoliating 30-40 acres of mountain hemlock and other conifers in Hell's Gulch on the Wallace Ranger District, Idaho Panhandle National Forests, during October 1978. We collected pupae in November, reared adult moths, and sent specimens to the U.S. National Museum and University of California for identification.

The Insect.--This moth is in the family Tortricidae and has been tentatively identified[2/] as Argyrotaenia sp. near gogana (Kearfott). There is very little known about gogana, but it was originally described from a single specimen from British Columbia. The original gogana type is at the American Museum of Natural History in New York[3/]. However, there are some specimens at the Pacific Forest Research Centre in Victoria, British Columbia, listed as Archips gogana Kft. These were collected from various conifers which included Douglas-fir and western hemlock, but this budworm is not considered a significant pest in British Columbia[4/]. There are no records of previous outbreaks in the Northern Rocky Mountain Region nor have any specimens been collected.

1/ First reported by Bob Sanders, silviculturist, Wallace Ranger District.

2/ Identified by Dr. Jerry A. Powell, professor of entomology, Univ. of California, Berkeley, California.

3/ Letter from J. A. Powell, September 7, 1979.

4/ Letter from Dr. John W. E. Harris, Pacific Forest Research Centre, Victoria, British Columbia, October 19, 1979.

Outbreak Status.--Heavy defoliation (figure 1) spread over several thousand acres (figure 2) in 1979 and appeared on the Cabinet Ranger District, Kootenai National Forest, Montana, around Ulm Peak. Many mountain hemlock and subalpine fir understory trees on the Wallace and Cabinet Districts were completely stripped of old and new foliage.

Figure 1.--Severe defoliation of mountain hemlock and other conifers in Hell's Gulch during late summer 1979.

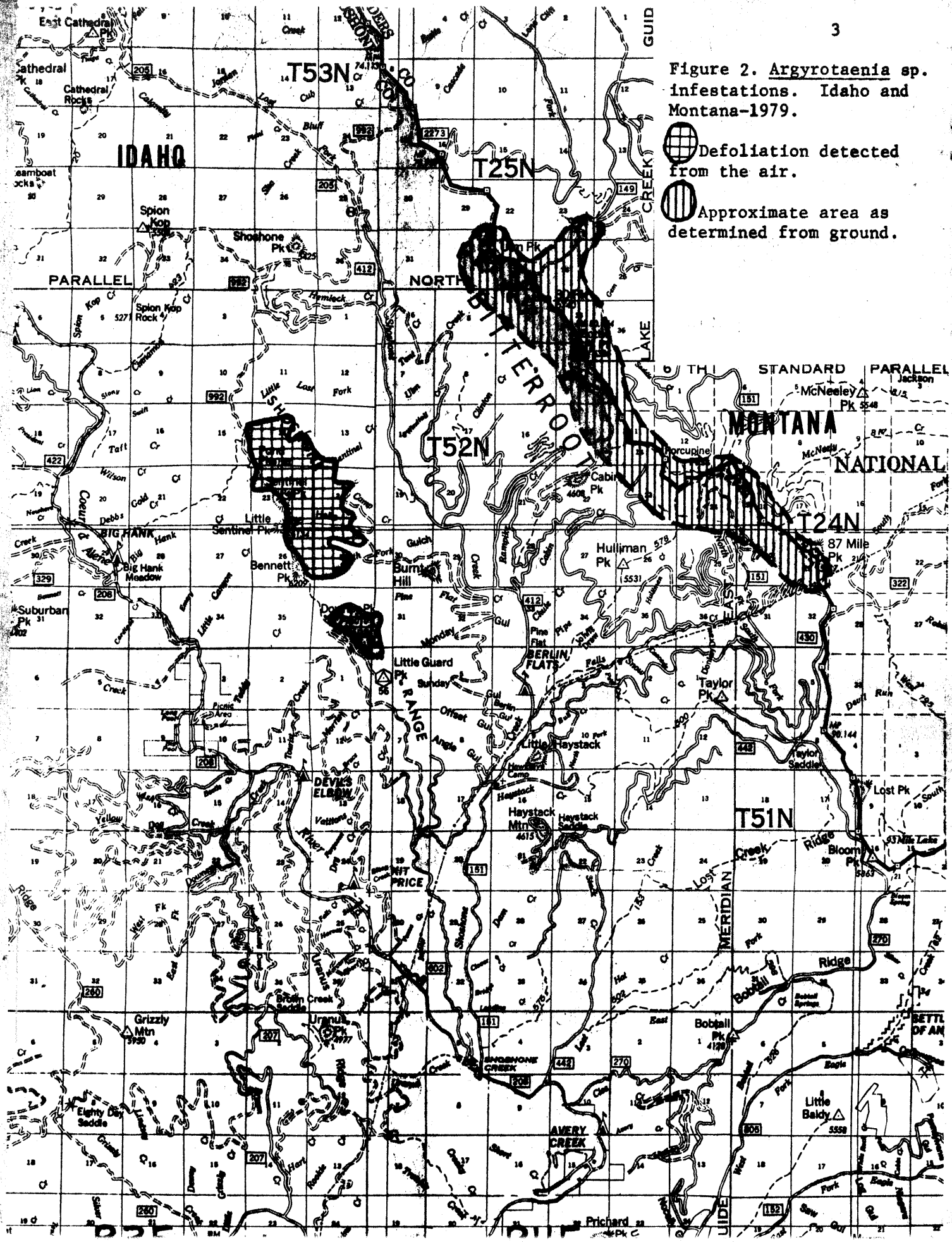

Figure 2. Argyrotaenia sp. infestations. Idaho and Montana-1979.

Defoliation detected from the air.

Approximate area as determined from ground.

Pupae were collected in November from the Ulm Peak infestation and dissected in December to determine percent parasitism (table 1). Total pupal parasitism was 19.6 percent, and 96.0 percent of parasitism was apparently caused by a single species of Hymenoptera. Pupal mortality from unknown causes was 28.8 percent which made total mortality 48.4 percent. When we examined the infested areas this fall, pupae were very abundant. With the low amount of overwintering parasitism, our tentative prediction is that the outbreak will continue in 1980 and may continue to spread through the mountain hemlock type.

TABLE 1.--Percent parsitism of overwintering pupae in the Ulm Peak area west of Noxon, Montana, 1979.

Plot	No. of Pupae Dissected	Parasites: Hymenoptera No.	Hymenoptera Percent	Diptera No.	Diptera Percent	Dead Pupae No.	Dead Pupae Percent	Viable Pupae No.	Viable Pupae Percent
1	86	6	7.0			12	13.9	68	79.1
2	100	28	28.0	2	2.0	25	25.0	45	45.0
3	52	9	17.3			20	38.5	23	44.2
4	64	14	21.9			30	46.0	20	31.2
Totals	302	57		2		87		156	
Avrg.			18.9		0.7		28.8		51.6

DESCRIPTION 5/

Adults.--Adult forewings are light mottled brown to orangish-brown and some have one distinct light tan band from the costal margin to the anal edge. Hindwings are light grey. Wingspread ranges from 16.5 to 21 mm and averages about 19 mm. Body length (including head) is from 6.5 to 9.5 mm and averages about 8 mm. The abdomen is light grey, and the thorax is medium orange and about 2 mm wide.

5/ Most of the colors used to describe life stages came from color name charts, Inter-Society Color Council, National Bureau of Standards.

Eggs.--We have not been able to find eggs, but suspect they are similar to those of other Argyrotaenia species described by Powell (1964). Eggs are deposited shingle-like to form an oblong mass (Powell 1964). They are probably laid on needles in the crowns of overstory trees by this species.

Larvae.--First instars are pale green-yellow with a black dash behind the ocelli on the head capsule and are about 4 mm long. Full grown larvae (figure 3) have light green-yellow abdomens, medium orange-yellow prothoracic shields, and light yellow-brown heads. Some larvae are browner. Largest larvae are about 9 mm long. Number of instars was not determined but is normally five for other species of Argyrotaenia (Powell 1964).

Figure 3.--Full-grown larva in webbed hemlock needles.

Pupae.--There are dark and light specimens, and they are about 2.1 mm wide and range from 5.5 to 8.8 mm long. Average length is 7 mm (figure 4).

Dark:

Head, thorax, and wings - dark brown to brown black
Abdominal segments 3-7 - brown black
Abdominal segments 8-10 - dark brown to brown black
Cremaster - always darkest color on pupa.

Light:

Head, thorax, and wings strong brown
Abdominal segments 3-7 - deep brown
Abdominal segments 8-10 - strong brown; occasionally deep orange
Cremaster - always darkest color on pupa.

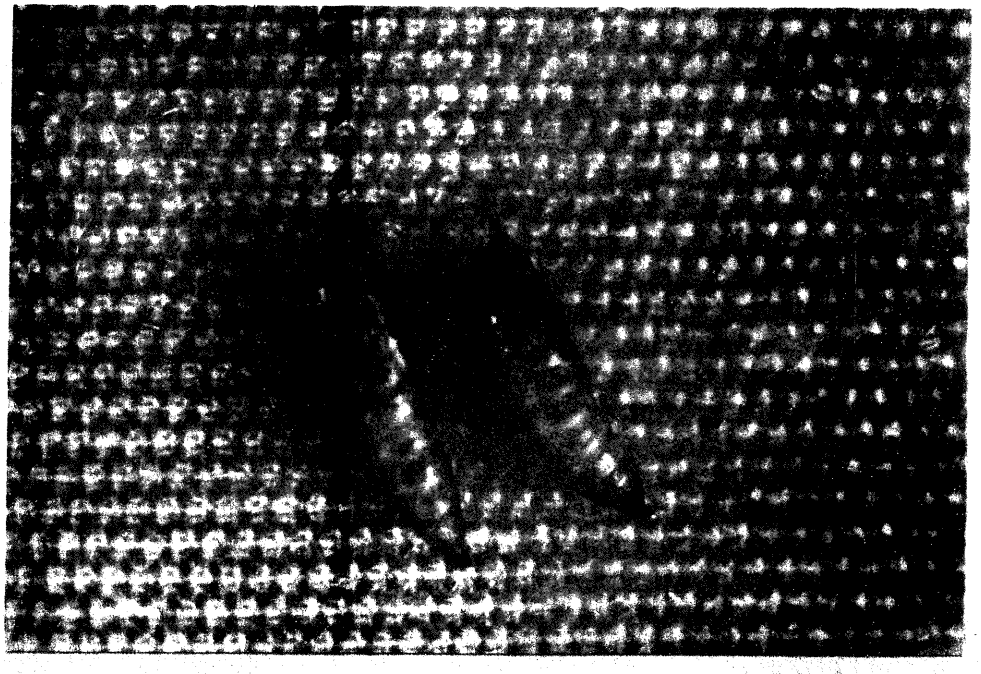

Figure 4.--Dark and light colored pupae.

LIFE HISTORY AND HABITS

In 1978, larvae fed until early November and then pupated inside their feeding shelters of webbed, chewed needles. Moths emerged from pupae reared in the laboratory by mid-November and from pupae left outside by mid-April 1979.

On July 5, 1979, first instars and a few second instars were feeding on new foliage of all hosts and initial mining-type feeding was evident on the needles. No egg masses could be found on understory trees. By August 30, full grown larvae and some pupae were present in webbed needles, and the defoliated area had reached its peak of redness. Pupae were numerous by September 21 in Hell's Gulch, and pupation was complete by October 16 near Ulm Peak.

The infestation extends to almost tree line (6,000 feet) in both areas.

In summary, our observations indicate that this species has one generation per year, and overwinters as pupae. At higher elevations, moths probably fly and lay eggs on needles by late May or early June. Eggs hatch by early July and larvae feed into the fall months, then pupate in webbed needles.

HOSTS

These following host tree species are listed in order of preference based on degree of defoliation.

1.	Mountain hemlock	Tsuga mertensiana (Bong.) Carr.
2.	Subalpine fir	Abies lasiocarpa (Hook.) Nutt.
3.	Western white pine	Pinus monticola Dougl.
4.	Grand fir	Abies grandis (Dougl.) Lindl.
5.	Lodgepole pine	Pinus contorta Dougl.
6.	Douglas-fir	Pseudotsuga menziesii var glauca (Beissn.) Franco
7.	Engelmann spruce	Picea engelmannii Parry
8.	Western larch	Larix occidentalis Nutt.
9.	Whitebark pine	Pinus albicaulis Engelmann

DISCUSSION AND RECOMMENDATIONS

This is a good example of field workers detecting a new forest pest of potential significance. Damage would probably not have been spotted until a year later during aerial surveys. Therefore, we have been given an opportunity to gain knowledge of this budworm from the onset of the outbreak.

At present, no control recommendations can be suggested for there are no insecticides registered or silvicultural methods recommended for this defoliator. Because of the vast number of overwintering pupae and low percent mortality, we expect the infestation to continue in 1980. We will obtain more information on the budworm's life cycle and habits and monitor the progress of the infestation then. We plan to start an impact survey in the damaged areas after the outbreak terminates and follow impact for 5 years.

REFERENCES

Powell, J. A. 1964. Biological and taxonomic studies on tortricine moths, with reference to the species in California. Berkeley and Los Angeles, California: University of Calif. Press. University of Calif. Pubs. in Entomology, 32:317.